Listing of Claims

1. (Currently Amended) A method for performing spectral imaging, comprising:

generating multiple-photon excitation in a specimen;

detecting photoacoustic waves resulting from the excitation, wherein the photoacoustic waves are generated by species, including non-fluorescent species; and

forming a spectral image based on the photoacoustic waves, wherein the multiple-photon excitation is generated based on simultaneous absorption of N photons by each of a plurality of molecules in the specimen, where $N \geq 2$.

2. (Canceled)

3. (Previously Presented) The method of claim 1, wherein the generating step includes: directing unscattered photons on the specimen to generate the multiple-photon excitation.

4. (Original) The method of claim 3, wherein the multiple-photon excitation is generated solely as a result of directing the unscattered photons onto the specimen.

5. (Original) The method of claim 1, wherein the photoacoustic waves derive from non-radiative relaxing light-absorbing species in the specimen.

6. (Original) The method of claim 1, wherein the photoacoustic waves derive

from non-fluorescent species in the specimen.

7. (Original) The method of claim 1, wherein the photoacoustic waves derive from fluorescent and non-fluorescent species in the specimen.

8. (Original) The method of claim 1, wherein the generating step includes:

irradiating the specimen with light to a predetermined depth and within a predetermined range of wavelengths.

9. (Original) The method of claim 8, wherein the specimen is tissue.

10. (Original) The method of claim 9, wherein the predetermined depth is several millimeters.

11. (Original) The method of claim 10, wherein the predetermined wavelength range includes wavelengths lying within a diagnostic window of the tissue.

12. (Original) The method of claim 1, wherein the specimen is tissue.

13. (Original) The method of claim 1, wherein the specimen is a collection of biological molecules.

14. (Original) The method of claim 1, wherein the photoacoustic waves include

ultrasonic waves.

15. (Original) The method of claim 1, further comprising:

analyzing the spectral image to detect a feature within the specimen.

16. (Original) The method of claim 15, wherein the feature is malignant tissue.

17. (Original) The method of claim 1, wherein the multiple-photon excitation is two-photon excitation in the specimen.

18. (Previously Presented) A system for performing spectral imaging, comprising:

an exciter which generates multiple-photon excitation in a specimen; and

a detector which detects photoacoustic waves from the specimen as a result of the excitation, wherein the multiple-photon excitation is generated based on simultaneous absorption of N photons by each of a plurality of molecules in the specimen, where $N \geq 2$ and wherein the molecules include molecules from non-fluorescent species.

19. (Canceled)

20. (Previously Presented) The system of claim 18, wherein the exciter generates two-photon excitation in the specimen based solely on unscattered photons.

21. (Original) The system of claim 18, wherein the exciter includes:

a laser which directs light within a predetermined range of wavelengths into the specimen.

22. (Original) The system of claim 21, wherein said predetermined range of wavelengths causes the light to penetrate a predetermined depth into the specimen.

23. (Original) The system of claim 22, wherein the specimen is tissue.

24. (Original) The system of claim 23, wherein said predetermined depth is several millimeters.

25. (Original) The system of claim 22, wherein said predetermined range of wavelengths includes wavelengths lying within a diagnostic window of the tissue.